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Tile Spacing Results on Taintor and Kalona Soils

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Abstract
In 1999, a 45-acre tile spacing project was installed adjacent to the Southeast Research Farm. This was done through donations by local drainage contractors, tile companies, and with assistance from the staff at the Southeast Research Farm. The goal was to compare recommended tile spacing (75 ft) with closer tile spacings.

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Introduction

In 1999, a 45-acre tile spacing project was installed adjacent to the Southeast Research Farm. This was done through donations by local drainage contractors, tile companies, and with assistance from the staff at the Southeast Research Farm. The goal was to compare recommended tile spacing (75 ft) with closer tile spacings.

Materials and Methods

Four different tile spacings (30, 45, 60, and 75 ft) plus an undrained control area were installed on 2.5-acre plots, which were replicated four times (Figure 1). The soils in the plot area are Kalona and Taintor soils. All tile lines were trenched at a 4-ft depth.

The field was planted to soybeans in 2000 and the even number years with corn planted in 2001 and the odd number years. In the nine years of the study, conditions have been favorably moist with only 2001, 2003, 2007, and 2008 having rainfall in April through June significantly above the long-term average for the site.

A concrete manhole was installed to collect tile flow rates and water quality samples coming off the east replication of the plots. Also, shallow ground water monitoring wells were installed midway between two tile lines in each plot. This allows the measurement of water table levels throughout the growing season. An example of this data is shown in Figure 2.

Results and Discussion

In monitoring flows from the first replication of the tile plots, there is almost always a higher flow rate from the 30-ft and 60-ft spacing plots compared with the other two spacings. These plots lay on either side of the "undrained" control plot (Figure 1). This indicates that the drained plots are taking water from a wider area than initially assumed. Therefore, the "undrained" control plots may be benefiting somewhat from the tile installed on either side.

In monitoring the water table levels, frequently the undrained control plots had higher water tables than the drained tile plots (Figure 2). However, very little difference in water table depth was seen between the different tile spacings. Following extreme rainfall events, the closer tile spacings gave slightly quicker drawdown of the water table. However, within 1 to 2 days the water table in all of the drained plots was 20 in. or more below the soil surface.

Of the five years that soybeans were planted, only 2008 was significantly wetter than normal from April through June. Soybean yields (Table 1) showed no differences between tile spacings and the "undrained" control treatment.

For the four years corn was planted, April through June was drier than normal in 2005, slightly wetter than normal in 2003, and much wetter than normal in 2001 and 2007. Corn yield benefits from drainage followed this pattern with minimal yield differences in 2005 (Table 2). However, the tile drained plots yielded about 10 bushels/acre more than the "control" plot in 2001, 15 bushels/acre more in 2003, and 20 bushels/acre more in 2007. These yield differences may have been even greater if the "undrained" control plots had been more isolated from the tile drained plots. In all of the years there was very little difference in yields between the tile spacings.

In this study on Kalona and Taintor soils, it seems that all drainage spacings have given nearly equal results in terms of water table drawdown and yield levels. This is consistent with the tile spacing recommendation in the Iowa Drainage Guide of 80–100 ft tile spacing for tile 48 in. deep on Taintor and Kalona soils.

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Table 1. Soybean yield results – bushels/acre.

Tile spacing	2000 soybeans	2002 soybeans	2004 soybeans	2006 soybeans	2008 soybeans
Check	47.4	58.1	65.6	51.4	62.1
75 ft	46.5	56.7	66.3	50.5	64.2
60 ft	45.7	55.3	67.1	50.8	62.0
45 ft	45.9	56.6	69.0	50.7	65.4
30 ft	47.1	55.9	65.4	51.1	63.5

Table 2. Corn yield results – bushel/acre.

Tile spacing	2001 corn	2003 corn	2005 corn	2007 corn
Check	169	172	179	170
75 ft	179	186	177	192
60 ft	177	188	175	189
45 ft	178	188	178	192
30 ft	176	187	180	192

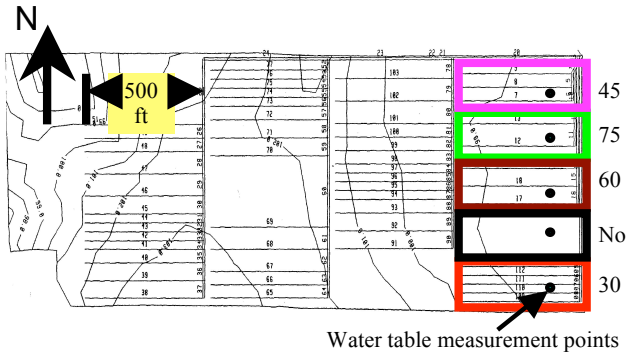

Figure 1. Tile spacing study layout.

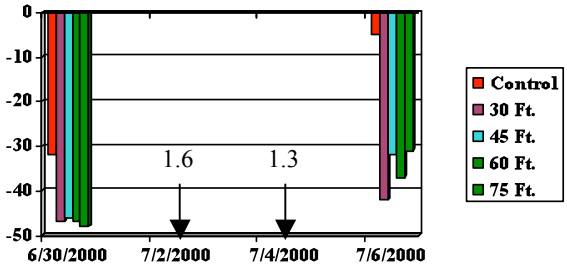

Figure 2. Depth to water table (in.) following 2.9 in. of rainfall.